Flexible Log Scale

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Understanding the Problem

The requirement is to plot the data shown in columns B and C of Figure 1. The graph should use a logarithmic scale for the y-axis, with a minimum value of 40, a maximum value of 460,000. In addition, the graph should contain grid lines at those two values of y, as well as at y = 100, y = 1,000, y = 10,000, and y = 100,000. The resulting graph should look like Figure 2.

	A	В	С	D
1				
2		Da	ata for Le	og Plot
3		x values	y values	log (y values)
4		1	45	1.653212514
5		2	543	2.73479983
6		3	3459	3.538950562
7		4	18098	4.257630584
8		5	450769	5.653954041





Figure 2

Getting Started

Instead of plotting the actual y-values and formatting the y-axis as having a log scale, calculate the log values in the spreadsheet (see column C in Figure 1) and plot those using a XY-scatter plot as in Figure 3.





Fix the chart

Remove the gridlines (select the chart and then the menu item Chart | Chart Options... | Gridlines tab). Format the plot area to remove the border and the background (select the Plot Area and then the menu item Format | Selected Plot Area...).

Finally, remove the tick marks and the values shown on the y-axis (click on the y-axis and then select the menu item Format | Selected Axis... | Patterns tab. The last format change is shown in Figure 4. The result should look like Figure 5.

Format Axis		? ×
Patterns Scale Font N Lines Automatic None Custom Style: Qolor: Automatic Weight: Sample Sa	Number Alignment Major tick mark type Inside Outside Inside Cross Minor_tick mark type None Outside Inside Cross Inside Cross Inside Cross Inside Cross Isolate Cross	
	ОК Са	ancel





Figure 5

Add the pseudo-y-axis

The data set for the pseudo axis is in Figure 6. Once again, remember to create the log of the y-values as in Column H.

	E	F	G	Н
1				
2		Data for	desired	y₋axis values
3		x-values	y-values	log (y-values)
4		0	40	1.602059991
5		0	100	2
6		0	1,000	3
7		0	10,000	4
8		0	100,000	5
9		0	460,000	5.662757832
40				

Figure 6

Create a new series with this data set – using the x-values and the log (y-values). Select the chart and follow the steps in Figure 7 through Figure 9.

M	🔀 Microsoft Excel - log scale chart.xls						
	<u>File E</u> dit <u>V</u> i	iew <u>I</u> nsert	F <u>o</u> rmat	<u>T</u> ools	<u>C</u> hart <u>W</u> indow <u>H</u> elp		
	🗅 휻 🖬 🎒 🗟 💖 🐰 🗈 🐔 🛛 Chart Iype					2	
Aria	Arial • 10 • B I Source Data					Ī	
CI	hart Area	-	=			ľ	
	E	F	G		<u>A</u> dd Data		
1					Add Trendline		
2		Data for	desired	y-axi	*		
3		v voluoe	v voluoe	log (-	





Figure 8

Paste Special		?×
Add cells as • New <u>s</u> eries • New <u>p</u> oint(s)	Values (Y) in C <u>R</u> ows C <u>C</u> olumns	OK Cancel
 ☐ Series <u>N</u>ames in First R ✓ Categories (X Values) ☐ Replace existing categories 	tow in <u>First Column</u> tegories	

Figure 9

Format the pseudo y-axis

Format the data series created above (either double-click the plotted series or select it and then select the menu item Format | Selected Data Series...) as shown in Figure 10 through Figure 12. This removes the line and the markers, and adds data labels and positive x error bars. Note that the value of 6 used in creating the error bars represents the maximum value of the x-axis itself.

The result will look incredibly messy; just wait for the next few steps.

Format Data Series		? ×
Data Labels	Series Order	Options
Patterns Axis	X Error Bars	Y Error Bars
Line C Automatic None C Custom Style: Color: Automatic Weight: Smoothed line Sample	Marker C Automatic None C Custom Style: Eoreground: Autom Background: Autom Size: 5 2 pts Shadow	natic V
	0	K Cancel

Figure 10

Format Data Series			? ×
Patterns	Axis	X Error Bars	Y Error Bars
Data Labels C None C Show value C Show percent Show label C Show label C Show bubble siz	percent res	Series Order	Options
			OK Cancel

Figure 11

Format Data Series			? ×
Data Labels Patterns Display Both Plus Error amount Error	Axis Minus 6 5); 1	Series Order X Error Bars	Options Y Error Bars
			OK Cancel

Figure 12

Format the error bars

Format the error bars by double-clicking on one of them. The idea is to remove the crossbar at the end of each error bar and to make them much 'lighter' in the effect they have on the chart. Figure 13 shows the necessary steps.

Format Error Ba	ars and the second s	? ×
Patterns X E	rror Bars Y Error Bars	
Line	<u>Marker</u>	
Custom		
<u>S</u> tyle:	······ •	
<u>C</u> olor:		
<u>W</u> eight:	Automatic	
Sample		
	ОК	ncel

Figure 13

Format the data labels

Currently, all the data labels are 'zero.' Change them so that they get their values from the y-values in Column G (Figure 6). Use Rob Bovey's Chart Labeler utility (<u>www.appspro.com</u>) or look at a Deja.com posting on how to accomplish the same goal "by hand."

Also, adjust the formatting of the data labels so that the text alignment is 'left,' and the label position is 'left,' as in Figure 14.

Format Data Labels		? ×
Patterns Font Number Alignme Text alignment Horizontal: Left Vertical: Center Label Position:	Orientation	
	OK Cance	:

Figure 14

Format the Y-axis

Adjust the minimum and the maximum y-axis values (Select the y-axis, then select the menu item Format | Selected axis... | Scale tab) so that they reflect the desired values. Remember to use the log of the desired values as in Figure 15.

	Н	I J K L M N (
1		Format Axis ? 🔀
2	y₋axis values	
3	log (y-values)	Patterns Scale Font Number Alignment
4	1.602059991	Value (Y) axis scale
5	2	Auto
6	3	Minimum: 1.602
7	4	Maximum: 5.663
8	5	
9	5.662757832	
10		IV Minor unit: U.2
11		Value (X) axis
12	•	<u>C</u> rosses at: 0
13		
14	-	Display units: None Mr Show display units label on chart
15	•	
16	- LI	Logarithmic scale
17		Values in reverse order
10		Value (X) axis crosses at <u>m</u> aximum value
20		
20	6	OK Cancel
21		

Figure 15

Format the X-axis

Adjust the x-axis scale so that the maximum is the desired value. Note that the length of the error bars must match this value.

Format Axis	? ×
Patterns Scale Font Number Alignment Value (X) axis scale Auto ✓ Minimum: 0 ✓ Maximum: 6	
✓ Major unit: 2 ✓ Minor unit: 0.4 ✓ Value (Y) axis ⊆rosses at: 0	
Display units: None Show display units label on chart Logarithmic scale Values in reverse order Value (Y) axis crosses at maximum value	
OK Cance	el

Figure 16

The result



Figure 17